Review of Inventory Issues Identified in Timber Supply Review AAC Rationales

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Summary of Suggestions

The suggestions below are based on a review of implementation recommendations in AAC rationale reports related to inventory and growth and yield issues as they can affect timber supply forecasts and subsequent AAC determinations.

Incentives to encourage licensees to use FIA or other funds to undertake the work needed to address the outstanding issues noted in the report by management unit (TSA/TFLs) needs to be explored. Even with improved incentives, however, there could be incomplete or spotty efforts made to address the concerns. Alternative or complementary provincial approaches are noted below for consideration where applicable.

Issue 1: Site productivity (managed stand yields, site index)
Assess (or use any existing assessments) of the provincial SIBEC data base to initiate a provincial project to improve expected reliability of site productivity estimates for regenerated managed stands particularly for those ecosystem types that contribute most to timber supply.

Issue 2: Existing unmanaged stand volumes (inventory audit; VRI phase 2)
Give high priority consideration for undertaking VRI phase 2 in Prince George, Quesnel, Kamloops and Mackenzie TSAs as the issue of existing stand volumes has been raised in these TSAs and they collectively represent about 33% of the current provincial AAC.

Issue 3: Vegetation Resource Inventory
High priority consideration should be given to undertaking VRI phase 1 for the Okanagan, 100 Mile and Merritt TSAs and TFL 46 and 47 with particular focus on the Okanagan TSA as the forest cover inventory is considered one of the oldest in the province.

Issue 4: Decay, waste and breakage
High priority consideration should be given to undertaking NVAF for the Merritt, Arrowsmith and Soo TSAs and TFL 30.

Issue 5: Site productivity: alternative silviculture systems
Develop (or further develop) a provincial data base on the productivity of forests due to use of alternative silvicultural systems with focus on those management units where uncertainty in this factor can have the greatest impact on timber supply.

Issue 6: Site productivity: forest health and OAFs
Initiate a provincial study or regional studies to refine OAF reductions with focus on those management units where uncertainty in this factor (due to concerns such as root rot) can have the greatest impact on timber supply.

Issue 7: Stand dynamics outside timber harvesting land base
Initiate a provincial study or regional studies that better allow disturbances in the non-timber harvesting land base (e.g. inoperable areas, parks) to be modeled with focus on those management units where uncertainty in this factor can have the greatest impact on timber supply.

Issue 8: NSR
Initiate a provincial study on ways to confirm or update the inventory files related to NSR, for example, using databases such as RESULTS.

Issue 9: Other forest inventory issues
Address the other forest inventory issues noted in Appendix 1 as resources allow.

Issue 10: Traditional use studies and related issues
That FIA and other funding mechanism be made available to support traditional use studies, AOAs and other related cultural heritage resource studies to help ensure these values are better addressed in timber supply review.

Issue 11: Recreation and landscape inventory
If not already underway, specific roles and responsibilities regarding the inventory should be clearly established between MOFR, MOAL and MOTSA with one task being to identify those inventories in greatest need for updating in support of timber supply review.

Methods

The inventory and growth and yield issues identified in 6 regional summaries of timber supply review (from AAC rationale reports) completed in March 2001 were compiled and collated by type of inventory-related issue. The regional summaries cover 83 rationale documents largely in TSR 1 but also some from TSR 2.

This initial compilation and collation of issues was augmented by reviewing all remaining newer AAC rationale reports not covered by the 2001 regional summaries – i.e. an additional 70 AAC rationales from TSR 2 and 3. The focus of the review was on "implementation" issues identified by the chief forester or deputy chief forester where additional inventory-related information was needed to improve subsequent AAC determinations.

The compiled issues from 153 AAC (see Appendix 1 and 2) rationale reports were compared with AAC rationale statements that the issue had or had not been resolved; and with *Copy of Inventory Status and Priorities November 2005* provided by the Forest Analysis and Inventory Branch which summarizes by TSA/TFL the status of inventory audits, inventory updates, VRI phase 1 and 2 work, FIA projects, forest inventory issues and priorities, and related information.

Each issue type is described below, in relative priority (in context of importance of issue with respect to timber supply and how many times the issue is raised in AAC rationale reports), with respect to:

- the *nature* of the issue and why it is important to timber supply review;
- *trends* in the issue from TSR 1 to TSR 3, and how or if the issue has been actioned and resolved;
- *outstanding issues* and status (description of required action, action underway, responsibility, and impact if not actioned); and a
- *suggestion(s)* on how to resolve the outstanding issue.

The 2001 regional summaries identified issues as being inventory or growth and yield related, and similar types of issues were addressed when reviewing post-2001 AAC rationales. However many issues that were not tagged as inventory or growth and yield-related do have a large connection with forest inventories. For example:

- estimates of unsalvaged losses;
- spread and severity of mountain pine beetle infestation;
- environmental sensitivity areas (ESAs);
- harvesting performance in problem forest types and their identification; and
- availability of old growth forests to achieve legal targets.

These inventory-related issues are not directly addressed in this review unless they were tagged as being an inventory issue in the regional summaries or in the implementation section of the AAC rationale reports.

Issue 1: Site productivity (managed stand yields, site index)

nature of the issue

The productivity of a site largely determines how quickly trees will grow. This in turn affects the time seedlings will take to reach green-up conditions (i.e. to achieve forest cover adjacency constraints in timber supply review), the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size. If regenerating managed stands can reach merchantable age at an earlier age than originally estimated due to refined work showing that sites have higher site productivity, then the time interval to harvest existing mature unmanaged stands can be correspondingly shortened and the short-term AAC can often be increased. In addition, the previously estimated "fall down" in mid- to long-term timber supply can be reduced or often eliminated in many TSAs or TFLs should estimated site productivity increase.

trends

Because of the vital importance of site productivity estimates to timber supply review, 45 AAC rationales in TSR 1 (about 73% of all TSR 1 rationales) emphasized the importance of assessing the implications of the then on-going provincial paired plot study on timber supply prior to the next determination. In TSR 1, site productivity was largely based on the estimates of volume growth from mature stands (using VDYP) whose ages had often exceeded culmination of mean annual increment and therefore was believed to significantly underestimate site productivity. Paired plot studies (e.g. Old Growth Site Index or OGSI project) looked at the site productivity of younger managed stands between 30 and 150 years of age in comparison to comparable old-growth stands on similar sites. The studies confirmed that when old stands are harvested and regenerated, site productivity is generally higher than inventory-based site index estimates of older stands would predict.

The OGSI study led to the Site Index Biogeoclimatic Ecosystem Classification (SIBEC) work where site productivity estimates were provided, based on field samples, to distinctive biogeoclimatic units that could be identified from Predictive Ecosystem Mapping (PEM) using VRI or forest cover inventory.

In TSR 2 and 3, refined site productivity estimates using OGSI or SIBEC/PEM were used in most TSAs/TFLs which showed substantial improvements in the timber supply forecast in the mid- to long-term, and in some units also in the short-term.

Nevertheless, even with this refined information, the need for improved estimates for site productivity was raised in 49 TSR 2 AAC rationale reports (about 71%) and in 12 TSR 3 rationales (about 55% of those available for review). The main concern raised was that the substantive increases in site productivity now estimated should be confirmed or revised based on local sampling within the applicable TSA or TFL to augment the provincial OGSI or SIBEC work. Additional sample plots collected in TSAs/TFLs is also used to annually revise the provincial SIBEC thereby improving estimates overall. A limiting factor in some management units in providing additional sample plots may be

the relative difficulty of finding suitable managed stands between 30 and 150 years of age; for example, where harvest history is relatively recent. Also, in some units, the need for PEM mapping, or improved PEM mapping, is also identified.

outstanding issues

The TSAs/TFLs in TSR 3 or 2 were it is recommended that additional local sampling be undertaken to confirm/refined site productivity estimates are listed below where the status of this work is unknown at this time.

TSAs in TSR 3	TFLs in TSR 3	TSAs in TSR 2*	TFLs in TSR 2*
Arrow	8	Arrowsmith	10
Fraser	15	Boundary	19
Golden	53	Bulkley	26
Invermere	57	Cassiar	30
Prince George		Cranberry	35
Quesnel		Cranbrook	39
Revelstoke		Kalum	43
		Kingcome	47
		Kispiox	48
		Lakes	55
		Lillooet	56
		Mackenzie	
		Merritt	
		Mid-Coast	
		Morice	
		Nass	
		North Coast	
		100 Mile House	
		Robson Valley	
		Soo	
		Strathcona	
		Sunshine Coast	
		Williams Lake	

*if raised in TSR 2 and 3 only listed in TSR 3

The majority of the management units (45, or about 66%) are explicitly mentioned in AAC rationales as in need of additional site productivity work at the local level to improve estimates in support of timber supply review. Although SIBEC has greatly improved estimates of site productivity in support of timber supply review, there remains some uncertainty and this uncertainty not only can cause substantial effects on mid- to long-term timber supply but also to short-term timber supply in some management units. A particular concern is some units is where the short-term timber supply has been substantially increased (e.g. due to beetle uplifts or increased estimates of existing stand volumes) with expectation that forecasted mid-term levels are acceptable but predicated on existing site productivity estimates using provincial SIBEC or OGSI data without significant sampling within the unit itself. This causes angst regarding future timber

supply and the possibility that necessary adjustments from the short-to mid-term levels may result in larger decreases than currently forecasted.

suggestion(s)

Incentives to encourage licensees to use FIA or other funds to undertake the recommended local site productivity sampling work needs to be explored to help ensure the outstanding concerns raised in AAC rationale reports are addressed.

Even with improved incentives, however, there could be incomplete or spotty efforts made to address the concerns. An alternative or complementary approach may be to assess (or use any existing assessment of) the provincial SIBEC data base to initiate a provincial project to improve expected reliability of site productivity estimates particularly for those ecosystem types that contribute most to timber supply.

Issue 2: Existing unmanaged stand volumes (inventory audit; VRI phase 2)

nature of issue

Uncertainty in the volumes in existing unmanaged stands as determined from inventory attributes (such as age and height by species and site index) can affect short-term timber supply which is the primary focus of an AAC determination over a 5-year time period. Sensitivity analysis in many management units (TSAs/TFLs) show a general direct relationship between a possible increase or decrease in existing unmanaged stand volumes and available short-term timber supply (e.g. a 10% increase or decrease in volumes often affects short-term timber supply by a corresponding 10%).

trends

Because of the vital importance of this issue to timber supply, and because of uncertainties with respect to existing forest cover inventories in enabling accurate estimates to be provided, 38 AAC rationales in TSR 1 (just over 60% of all 62 TSR 1 rationales) specifically highlighted the need to get more accurate estimates of existing unmanaged stand volumes.

The Inventory Audits largely completed between 1994 and 1999 helped to address this issue. In some TSA/TFLs, the audits found volume estimates based on the inventory to be reasonable accurate, in other units, volume estimates were under- or over-estimated.

In TSR 2, the results of the inventory audits were considered in AAC determinations when available. As a consequence the issue of existing unmanaged stand volumes was less frequently raised (i.e. in 11 rationales, or about 16% of the 69 total number of TSR 2 rationales). Where the issue remained a concern, this was often because the inventory audit showed strong trends that estimated volumes were either under- or over-estimated but the results were not statistically significant for the portion of the land base that contributes to timber supply (i.e. the timber harvesting land base). As a consequence, a request was sometimes made in these rationales that additional work be carried out.

The Vegetation Resource Inventory (VRI) is replacing the older forest cover inventory mapping for TSAs and TFLs over time. VRI phase 2 ground sampling can be conducted prior to phase 1 photo-interpretation work. Phase 2 work provides a basis for verifying or adjusting inventory attributes as it relates to estimating existing unmanaged stand volumes (i.e. it has replaced the forest cover inventory audits).

In TSR 3, the need for phase 2 work to be completed in order to provide better estimates for existing unmanaged stand volumes was raised in 6 rationales (about 27% of the 22 TSR rationales reviewed). Also, where phase 2 sampling has been completed, particularly where the work indicates substantial increases in volumes for existing unmanaged stands and this up-dated information has been used to increase the AAC – there has been the occasional request in AAC rationales to confirm or refine the estimated increased volumes through monitoring of the phase 2 work (e.g. in the TFL 49).

The issue therefore can be viewed as a critical concern in TSR 1 (prior to inventory audit program), a moderate issue during TSR 2 (with inventory audits largely completed), to an important concern in TSR 3 for many TSAs/TFLs where VRI phase 2 is deemed necessary to improve subsequent AAC determinations.

The management units in TSR 2 and 3 where the issue remains an important concern and the extent to which the issue has been addressed is summarized below:

Issue raised but appears to be actioned (completed or in-progress):

Sunshine Coast-TSR2	VRI phase 2 done
Fort Nelson – TSR 2	VRI phase 2 done
100 Mile House-TSR2	VRI phase 2 done
Golden –TSR3	VRI phase 2 in-progress
TFL 45 – TSR2	VRI phase 2 in-progress
TFL 48 – TSR2	VRI phase 2 in-progress
TFL 52 – TSR2	VRI phase 2 in-progress

outstanding issues

Issue raised but appears to remain an outstanding concern:

Quesnel – TSR3	No VRI work including phase 2
Prince George – TSR3	No VRI phase 2
Mackenzie- TSR2	No VRI phase 2
Kamloops- TSR2	No VRI phase 2
Revelstoke – TSR3	No VRI phase 2
TFL 15 – TSR3	No VRI phase 2
TFL 49 – TSR3	VRI phase 2 complete but estimated increases in volume need to monitored to confirm or refine
Cassiar – TSR2	No VRI phase 2
Kispiox – TSR 2	No VRI phase 2
Mid Coast – TSR 2	No VRI phase 2

suggestion(s)

The Prince George, Quesnel, Kamloops and Mackenzie TSAs represent a total AAC of 27.6 million cubic metres – or about 33% of the current provincial AAC of 83 million cubic metres. If up to a 10% uncertainty exists in existing stand volumes for just these four TSAs, resolving this uncertainty could increase or decrease the AAC by up to 3 million cubic metres. This uncertainty therefore can represent a substantive impact on the local, regional and provincial economy. Consideration therefore should be given to giving high priority focus to these four TSAs.

Issue 3: Vegetation Resource Inventory

nature of issue

The existing forest cover inventory in several TSAs and TFLs is old and needs to be replaced with a more up-to-date VRI. Older forest cover inventories not only result in uncertainties with respect to existing unmanaged stand volumes (as discussed above in issue 2), but also result in uncertainty with respect other inventory attributes that have a direct bearing on timber supply (such as the age of forests that determine when various mature or old forest cover targets have been achieved).

trends

The need for a re-inventory and current status of this effort is summarized in table below by TSR (where the issues have not already been raised in context of phase 2 work under Issue 2 above).

Issue raised but appears to be actioned (completed or substantially completed):

TFL 15 – TSR2	Phase 1 complete and 2 in progress
Golden-TSR2	Phase 1 complete and 2 in progress
Arrow- TSR2	Phase 1 complete and 2 in progress
Fraser – TSR3	Phase 1 and 2 complete; need to update VRI done to 2001
Dawson Creek-TSR2	40% phase 1; phase 2 done
Fort Nelson-TSR2	Phase 1 done for operable land base
Fort St. John-TSR2	45% phase complete

outstanding issues

Issue raised but appears to remain an outstanding concern or only partially completed:

100 Mile House-TSR2	No phase 1; phase 2 completed
Okanagan-TSR3	3% phase 1; phase 2 completed
Merritt – TSR2	No phase 1; phase 2 done
TFL 46 – TSR2	Not available
TFL 47 – TSR2	Portions of TFL are high priority for inventory

suggestion(s)

High priority consideration should be given to undertaking VRI phase 1 for the Okanagan, 100 Mile and Merritt TSAs and TFL 46 and 47 - with particular focus on the Okanagan TSA as the forest cover inventory is considered one of the oldest in the province.

Issue 4: Decay, waste and breakage

nature of issue

"Allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area" is specifically mentioned in the *Forest Act* as one of the considerations that the chief forester must take into account when making AAC determinations. Stand volumes available to support timber supply are therefore adjusted to account for decay, waste and breakage (DWB) in timber supply analysis.

trends

In TSR 1, 19 of the rationales (about 30%) noted the need to improve allowances for DWB and often mentioned the need to incorporate new provincial DWB factors.

Under VRI, Net Volume Adjustment Factors (NVAF) sampling for a TSA or TFL is currently considered to provide measures of net merchantable volume of stands after reductions for decay and other factors that are more accurate than the standard 1976 provincial loss factors. NVAF is the ratio of a tree's actual net merchantable volume (measure using destructive sampling) to the volume estimated by a timber cruiser.

In TSR 2 and 3, the issue was only raised in 6 rationales (about 7%) with current status of work noted below:

Issue raised but appears to be actioned (completed or underway):

Kamloops- TSR2	NVAF planned for 2005
Golden – TSR2	NVAP in progress

outstanding issues

Issue raised but appears to remain an outstanding concern:

Merritt – TSR 3	No NVAF
Arrowsmith – TSR2	NVAF unknown
Soo-TSR2	NVAF unknown
TFL 30	No NVAF

suggestion(s)

High priority consideration should be given to undertaking NVAF for the Merritt, Arrowsmith and Soo TSAs and TFL 30.

Issue 5: Site productivity: alternative silviculture systems

nature of issue

Alternative silvicultural systems such as partial cutting or variable retention are often promoted in order to better provide for non-timber values such as visuals or biodiversity, or were undertaken decades ago with residual stands remaining. There is less information about growth and yield in these stands, many of which are uneven aged, following harvest and consequently concern that their productivity may not be appropriately modeled in timber supply analysis. Better information about stand

dynamics following alternate harvest systems should facilitate improved operational decisions about when and where these systems should be used.

trends

The need for improved information was cited in 15 rationales in TSR 1 (about 25%), 10 in TSR 2 (about 15%), and so far in 2 TSR 3 rationales (about 10%).

outstanding issues

The need for this information appears to remain an outstanding issue in the following TSAs and TFLs from TSR 2 and 3:

- TSAs: Merritt and Cranbrook;
- TFLs: 18, 46, 47, 48, 56, 57

suggestion(s)

Incentives to encourage licensees to use FIA or other funds to undertake the recommended local site productivity sampling work for alternative silviculture systems needs to be explored to help ensure the outstanding concerns raised in current and future AAC rationale reports are addressed.

Even with improved incentives, however, there could be incomplete or spotty efforts made to address the concerns. Another or complementary approach may be to develop (or further develop) a provincial data base on the productivity of forests due to use of alternative silvicultural systems (such as uneven aged stands) with focus on those management units where uncertainty in this factor can have the greatest impact on timber supply. This can be assessed by reviewing available sensitivity analyses in timber supply analyses documents.

Issue 6: Site productivity: forest health and OAFs

nature of issue

In timber supply analysis, the standard BCFS growth and yield model Table Interpolation Program for Stand Yields or TIPSY are used to estimate the timber volumes for regenerated managed stands. The TIPSY projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition. However, certain operational conditions, such as a less-than-ideal distribution of trees, the presence of small non-productive areas, endemic pests and diseases, or age-dependent factors such as decay, waste and breakage, may cause yields to be reduced over time. Two operational adjustment factors (OAFs) are therefore applied to yields generated using TIPSY, to account for losses of timber volume resulting from these operational conditions. OAF 1 is designed to account for factors affecting the yield curve across all ages, such as small stand openings. OAF 2 accounts for factors whose impacts tend to increase over time such as pests, disease, decay, waste and breakage. In most timber supply analysis, the standard provincial modeling reductions of 15 percent for OAF1 and 5 percent for OAF2 are applied.

Several AAC rationales express concern that the standard OAF reductions may not be applicable to a particular TSA or TFL because of unusually severe forest health issues affecting some regenerating stands such the impacts of Armillaria root rot.

trends

The concern was raised in 16 TSR 1 AAC rationales (about 26%), 14 TSR 2 rationales (about 20%), and so far about 5 TSR 3 rationales (about 23%). Although some limited work has been undertaken in some TSAs, the concern remains in many management units and/or the nature of the studies undertaken need further refinement to improve the estimated reduction factor to be applied.

outstanding issues

The following TSAs and TFLs listed in TSR 2 and 3 where the issue appears to remain outstanding:

- TSAs: Arrow, Arrowsmith, Cranberry, Kispiox, Kootenay Lake, Merritt, 100 Mile House, Revelstoke
- TFLs: 10, 15, 18, 33, 35, 49 and 56.

suggestion(s)

Incentives to encourage licensees to use FIA or other funds to undertake the recommended local sampling work to refine OAF adjustments needs to be explored to help ensure the outstanding concerns raised in current and future AAC rationale reports are addressed.

Even with improved incentives, however, there could be incomplete or spotty efforts made to address the concerns. Another or complementary approach may be to initiate a provincial study or regional studies with focus on those management units where uncertainty in this factor can have the greatest impact on timber supply. This can be assessed by reviewing available sensitivity analyses in timber supply analyses documents.

Issue 7: Stand dynamics outside timber harvesting land base

nature of issue

Forest stands outside the timber harvesting land base, including inoperable areas and parks, do not contribute to timber supply, but are used in timber supply analyses to help achieve forest cover objectives that would otherwise constrain access to the timber harvesting land base. For example, mature and old growth stands in inoperable areas can contribute to attainment of the non-spatial old growth order – which is a legal objective under the *Forest and Range Practices Act* (FRPA), and to forest cover requirements for visuals and wildlife such as ungulate winter range which may also be legal objectives under FRPA.

Some timber supply analyses have continued to age non-contributing areas over time in the model – which overestimates the contribution of these areas to achieving forest cover objectives since some disturbances (such as fire) do occur.

trends

The issue was not raised in TSR 1, but has been raised in 6 rationales in TSR 2 (about 10%) and so far 4 in TSR 3 (about 18%). The trend therefore is increasing reference to this concern particularly in TSAs or TFLs with a relatively large area outside the timber harvesting land base and/or with large adjacent parks where their contribution to achieving forest cover objectives has a significant impact on timber supply

outstanding issue

The issue appears to remain outstanding in the following TSAs and TFLs:

- TSAs: Arrow, Cranbrook, Golden, Invermere, Merritt, Kamloops, Revelstoke
- TFLs: 53.

suggestion(s)

Incentives to encourage licensees to use FIA or other funds to undertake the recommended local work to better model disturbances in the non-timber harvesting land base need to be examined.

Even with improved incentives, however, there could be incomplete or spotty efforts made to address the concerns. Another or complementary approach may be to initiate a provincial study or regional studies with focus on those management units where uncertainty in this factor can have the greatest impact on timber supply. This can be assessed by reviewing available sensitivity analyses in timber supply analyses documents.

Issue 8: NSR

nature of issue

The issue of the size and contribution of not-satisfactorily-restocked (NSR) areas in TSAs and TFLs causes uncertainty in timber supply analysis. The age of existing inventories and the lack of recent updates can lead to questions regarding the nature of NSR areas that are labeled in existing inventory files. (Note: this issue was likely also raised as a "NSR" issue rather than an "inventory" issue and therefore may be a bigger issue than noted below).

trends

The need to confirm the area of NSR and their contribution over time to timber supply has been raised in 7 rationales in TSR 2 (about 11%) and the concern was repeated in 1 rationale in TSR 3.

outstanding issues

The issue appears to remain outstanding in the following units:

- TSAs: Dawson Creek, Quesnel, Revelstoke and Williams Lake
- TFLs: 42, 48 and 55.

suggestion(s)

Incentives to encourage licensees to use FIA or other funds to undertake the recommended local work to confirm the area of NSR needs to be examined.

Even with improved incentives, however, there could be incomplete or spotty efforts made to address the concerns. Another or complementary approach may be to initiate a provincial study on ways to confirm or update the inventory files related to NSR, for example, using databases such as RESULTS.

Issue 9: Other forest inventory issues

Several other forest inventory issues are noted in Appendix 1 and these should be reviewed and addressed as resources allow.

Issue 10: Traditional use studies and related issues

nature of issue

In the context of AAC determinations, accurate information on aboriginal interests and uses, and archaeological sites, can help ensure that cultural heritage and archaeological resources are appropriately factored into timber supply review. This helps reduce uncertainty in timber supply modeling and can help demonstrate respect for and responsiveness to aboriginal interests and uses.

trends

The need for improved information about cultural heritage and archaeological resources through inventories such as traditional use studies (TUSs) and archaeological overview assessments (AOAs) has been mentioned in 14 TSR 1 rationales (about 23%), 5 TSR 2 rationales (about 7%), and so far in 1 TSR 3 rationale. Several TUSs or AOAs were underway during TSR1 or were completed after TSR 1 which helped address the concern.

outstanding issues

Some recent rationales have expressed need that TUSs be completed in areas where they have not been undertaken and/or that cultural heritage resource information be provided in a manner where its impact on timber supply can be more appropriately modeled to account for First Nations interests. For example, the recent TSR 3 rationale for the Merritt TSA recommends completion of the TUS. Under FIA, however, TUSs are not an eligible activity.

suggestion(s)

That FIA and other funding mechanisms be made available to support traditional use studies, AOAs and other related cultural heritage resource studies to help ensure these values are better addressed in timber supply review. It is also important that existing studies are readily maintained as part of the inventory data base and not get inadvertently lost.

Issue 11: Recreation and visual landscape inventory

nature of issue

In the context of timber supply review, an accurate visual landscape inventory is particularly needed to help ensure that visual resource values are adequately accounted for in AAC determinations. Accounting for visual resources tends to have a greater impact on timber supply than recreation resources. However, an accurate recreation inventory is also useful to improve the accounting for this value particularly in those management units where much older ESA mapping for recreation (Er) have been used in timber supply analysis.

Trends

The need to improve the recreation or landscape inventory for TSAs or TFLs was mentioned in 7 TSR 1 rationales (about 11%) and 6 TSR 2 rationales (about 9%). Based on TSR 2 implementation recommendations, this appears to be an outstanding issue in the following units (or portions of those units):

- TSAs: Mid Coast, Merritt and Cranberry
- TFLs: 42 and 44

suggestion(s)

Incentives should be explored for licensees to utilize FIA or other funding sources to improve recreation and landscape inventories particularly where recommended in AAC rationales as an important implementation task. It is also important that existing inventories remain readily maintained as part of the inventory data base and not get inadvertently lost. If not already underway, specific roles and responsibilities regarding the inventory should be clearly established between MOFR, MOAL and MOTSA with one task being to identify those inventories in greatest need for updating in support of timber supply review.

Appendix 1:

Detailed Summary of Inventory Issues by TSA/TFL

Type of issue:
The 2001 regional summaries (see section on "Methods") characterized the many issues identified in AAC rationale documents into the following types:

- **Urgent** Issue: an outstanding issue which needs to be tracked closely and may lead to an early re-determination.
- **High** Priority Issue: work requested to be completed.
- **Information Need**: identifies issues where more information would be beneficial; often being addressed under an existing project.
- **Issue Statement**: identifies issues that require operational consideration or require further study.

AAC rationales reviewed (subsequent to the 2001 regional summaries – see Appendix 2) identifies issues raised under the:

- **Implementation** section of each rationale.

The bold names above are therefore used to characterize the type of issue in the tables below.

Status of issue:
The 2001 regional summaries use the terms:

- **yes** means that actions are underway to address the issue, and
- **complete** means that the issue has been successfully addressed.

As noted under "Methods", *Copy of Inventory Status and Priorities November 2005* was reviewed to assess status of issue where applicable.

- **IP** – refers to in-progress
- **%** - refers to percent of TSA or TFL with coverage where less than 100%.

Also:

- **-** or **unknown** or **?** – refers to not knowing the status of issue based on above information

Issue 1: Site productivity (managed stand yields, site index)

Regional summaries (March 2001)

Type	Issue	TSA/TFL	TSR	Status
Urgent	Examination of the data that supports TIPSY to ensure it reasonably estimates regenerated stand volumes in the TSA.	Mackenzie	1	-
Urgent	Assess and examine ways to localize VDYP to reduce uncertainties.	Lillooet	1	Complete
High	Assess the implications of the paired plot study	Prince George	1	-
High	Assess the implications of the paired plot study.	Quesnel	1	Yes

High	Assess the implications on the paired plot study.	Lillooet	1	Yes
High	Assess the implications on the paired plot study.	Arrow	1	Yes
High	Assess the implications on the paired plot study.	Kootenay Lake	1	Yes
High	Assess the implications on the paired plot study.	Revelstoke	1	Yes
High	Assess the implications of the paired plot study.	Kingcome	1	Yes
High	Assess the implications on the paired plot and SIBEC study	Cassiar	1	-
High	Assess the implications on the paired plot study.	Kalum	1	-
High	Assess the site productivity on small diameter pine	Lakes	1	-
High	Assess the implications on the paired plot study.	Lillooet	1	Yes
High	Assess the implications on the paired plot study	North Coast	1	Yes
Info. Need	Resolve potential for increased site index to augment timber supply	100 Mile House	1	Yes
Info. Need	Assess the implications on the paired plot study.	100 Mile House	1	Yes
Info. Need	Assess the implications on the paired plot study.	Williams Lake	1	Yes
Info. Need	Assess the implications on the paired plot study.	Robson Valley	1	-
Info. Need	Assess the implications on the paired plot study.	Kamloops	1	Yes
Info. Need	Assess the implications on the paired plot study.	Merritt	1	Yes
Info. Need	Assess the implications on the paired plot study.	Okanagan	1	Yes
Info. Need	Assess the implications of the paired plot study and other findings and incorporate into next determination.	Strathcona	1	Yes
Info. Need	Site productivity work required in all managed stands for both single and mixed species.	Kispiox	1	Yes
Info. Need	Assess the implications on the paired plot study.	Boundary	1	Yes
Info. Need	Assess the implications on the paired plot study.	Invermere	1	Yes
Info. Need	Assess the implications on the paired plot and SIBEC study	Bulkley	1	Yes
Info. Need	Assess the implications on the paired plot study	Nass	1	-
Info. Need	Use managed stand yield tables to establish regenerated stand volumes	Kootenay Lake	1	Complete
Info. Need	Assess the implications of the paired plot study	Soo	1	Yes
Issue Statement	Use managed stand yield tables to establish regenerated stand volumes	Arrow	1	Complete
High	Assess the implications of the paired plot study and licensee's study	TFL 19	1	-
High	Further improvements in managed cottonwood stand yield.	TFL 43	1	-
High	Assess the implications on the paired plot study.	TFL 52	1	?
High	Licensee to prepare yield curves which more accurately reflect the conditions of the stands being modeled	TFL 6	1	-
Info Need	Examine the possibility that site productivity is underestimated.	TFL 30	1	-
Info. Need	Examine uncertainty of assignment of managed stands for stands between 30 and 40 years of age.	TFL 47	1	-
Info. Need	Have methods reviewed by Research and Resource Inventory Branches. Complete necessary work prior to MP No. 9	TFL 6	1	-
Info. Need	Continue exploring methods to assess/adjust site index	TFL 10	1	-
Info. Need	Additional studies for ecosite classification required.	TFL 24	1	-
Info. Need	Better quantify effects of stand conversion on site index.	TFL 24	1	-
Info. Need	Develop appropriate methodology to deal with site index estimates.	TFL 25	1	-
Info. Need	Assess the implications of the paired plot study and other	TFL 45	1	-

	findings and incorporate into next determination			
Info. Need	Assess the implications on the paired plot study.	TFL 18	1	-
Info. Need	Assess the implications on the paired plot study.	TFL 33	1	-
Info. Need	Assess the implications on the paired pilot study.	TFL 14	1	-
High	Monitor performance in regenerated stands with field-based plots to determine whether the increases in site productivity suggested by the old growth site index studies are in fact warranted.	Golden	2	-
High	Assess the implications of the paired plot study particularly the uncertainty with respect to Sitka spruce	QCI	2	Yes
Info. Need	Obtain localized data to provide better estimates of site productivity.	Soo	2	-
Info. Need	Site productivity studies to assess the appropriate adjustments to incorporate in future timber supply analyses.	Mid Coast	2	-
Info. Need	Obtain improved site productivity information for the managed stands in the TSA	North Coast	2	-
Info. Need	In consultation with Research Branch staff, validate an appropriate site index adjustment for the TSA, for single and mixed species.	Cranberry	2	-
Info. Need	Performance in regenerated stands should be monitored with field-based plots to determine if the increases in site productivity suggested by the old growth site index studies are fully warranted.	Revelstoke	2	-
Info. Need	Collect improved site productivity data for the stands in the TSA, including involvement as appropriate in the ongoing project under the IFPA.	Arrow	2	-
Info. Need	Study and report on the specific implications of old growth site adjustments in the TSA, and the extent to which these have already been accounted for in the inventory.	Strathcona	2	-
-	Work with Research Branch staff to assess the degree of applicability of provincial site index adjustments to the TSA, as will as the indications that inventory inaccuracies have led to underestimation of site productivity in 20- to 60 year old stands	Kalum	2	-
High	Test accuracy of site indexes applied in current analysis.	TFL 8	2	-
Info. Need	Continue monitoring the permanent G&Y sampling plots, which will provide information that is reflective of the growing conditions within the TFL and install new PSPs	TFL 43	2	-
-	The licensee work with BCFS staff to monitor managed stand yields, in particular with regard to the yields attributed to genetic gain and site productivity estimates as projected in the analysis.	TFL 53	2	-

Rationales since regional summaries (post March 2001)

Type	Issue	TSA/TFL	TSR	Status
Implement	To maintain accurate projections of future timber supplies, carry out field studies to refine estimates of the site indices for those zones and species not already addressed in the previous study (i.e. completed in CWH but not IDF, MH, or ESSF.	Fraser	3	-
Implement	Collect local site productivity data since no local studies have been undertaken in TSA.	Sunshine Coast	2	-
Implement	Collect the necessary data through the TEM project to allow for more precise estimates of site productivity using SIBEC	TFL 39	2	-

Implement	In view of the potential benefits to timber supply projections, as identified in other parts of the province, I encourage licensees to apply for FIA funding to carry out local field studies to refine estimates of site indices specific to the TSA for direction application in future timber supply analyses, rather than relying on the provincial OGSI or veteran figures. It is possible that underestimated OAFs could be offset by underestimated site indices. (OGSI plots were outside TSA)	Golden	3	-
Implement	Initiate work in the district to confirm site productivity in view of the high sensitivity of the mid-term timber supply to increases in site index.	Quesnel	2	-
Implement	Initiate work in the district to confirm site productivity, in view of the corresponding potential to increase the mid-term timber supply.	Quesnel	3	-
Implement	Collect data from stands within the TSA to provide better certainty around the magnitude of site productivity adjustments	Prince George	2	-
Implement	Continue work to confirm site productivity, in view of the potential increase to the mid- and long-term timber supply	Prince George	3	-
Implement	Collect information on appropriate site index adjustments for species other than pine	Lake	2	-
Implement	Conduct a study on site productivity specific to the TSA	Mackenzie	2	-
Implement	Consider doing Site Index/BEC (SIBEC) work or ground sampling to improve estimates of productivity because of its impact on minimum harvestable ages	TFL 57	3	-
Implement	Site productivity for existing and future managed stands based on PEM/SIBEC. Given sensitivity of timber supply in TSA to uncertainty in site index, monitoring growth of young stands would be useful as part of IFPA	Arrow	3	-
Implement	Collect site productivity data from stands within the TSA to determine if adjustments are appropriate	Arrowsmith	2	-
Implement	Review the assumptions to decrease the uncertainty about site productivity estimates	Boundary	2	-
Implement	Improve site index information for the OASIS approach to estimating site index	Bulkley	2	-
Implement	Clarify site productivity issues and associated issues of green-up by reviewing SIBEC and inventory data	Cassiar	2	-
Implement	Licensees encouraged to develop PEM for use in SIBEC assessment of managed stand site indices given large potential impact on timber supply relative to use of inventory derived site indices	Cranbrook	2	-
Implement	The use of SIBEC-derived site indices for managed stands has a large impact on timber supply. I acknowledge the significant research behind these estimates showing that first and second approx. SIBEC estimates are suitable for supporting AAC determinations. I ask licensees to continue to monitor growth and yield from their second growth stands to track against expected productivity as predicted from SIBEC. I also ask licensees to continue to refine PEM to allow continued improvement and better estimates of site index	Invermere	3	-
Implement	Collect local data to better define the site productivity of second growth stands	Kingcome	2	-
Implement	Collect local site productivity data to enable an assessment of the applicability of provincial site index adjustments to	Kispiox	2	-

	managed stands in the TSA			
Implement	Collect data on site productivity from stands within the TSA	Lillooet	2	-
Implement	Collect local data to improve confidence about the magnitude of site productivity adjustments appropriate for the TSA	Merritt	2	-
Implement	District staff should pursue funding for site productivity studies to assess the appropriate adjustments to incorporate in future timber supply analysis	Mid Coast	2	-
Implement	Collect data on site productivity from stands within the TSA	Morice	2	-
Implement	Collect data from the Nass TSA to confirm appropriate estimates of site productivity	Nass	2	-
Implement	Obtain improved site productivity information for the managed stands in the TSA	North Coast	2	-
Implement	Work with licensee staff to collect improved site productivity data for stands in the TSA	Okanagan	2	Work done in 2002
Implement	Collect and analyze more local data regarding site productivity estimates in the TSA	100 Mile House	2	-
Implement	Performance in regenerated stands should be monitored with field-based plots to determine if the increases in site productivity suggested by the OGSI studies are fully warranted	Revelstoke	2	-
Implement	That district and licensee staff work to gather local data to better quantify the site productivity in old growth stands	Revelstoke	3	-
Implement	Resolve the appropriate adjustments to make to site indices in the TSA and monitor growth in second growth stands	Robson Valley	2	-
Implement	Obtain localized data to provide better estimates of site productivity	Soo	2	-
Implement	Study and report on the specific implications of OGSI adjustments in the TSA and the extent to which these have already been accounted for in the inventory	Strathcona	2	-
Implement	In view of the associated potential for large increases in the projected timber supply, I encourage the collection of locally-based estimates of site productivity for consideration in the next determination	Williams Lake	2	-
Implement	If possible, improve site index estimates in the ESSF	TFL 8	3	-
Implement	Collect localized site productivity information	TFL 10	2	-
Implement	Develop local site index estimates for interior Douglas-fir and spruce to reduce the uncertainty regarding the application of the provincial site index conversions	TFL 15	3	-
Implement	Strengthen the basis for site index assumptions	TFL 19	2	-
Implement	Collect localized site productivity estimates	TFL 26	2	-
Implement	Examine and refine site index estimates applied in higher elevation stands	TFL 30	2	-
Implement	Confirm or refine the estimates of site index for high elevation areas and for spruce generally	TFL 35	2	-
Implement	Continue monitoring the permanent G&Y sampling plots, which will provide information that is reflective of the growing conditions within the TFL, and install new permanent sample plots in the Kingcome and Homathko Blocks	TFL 43	2	-
Implement	Investigate site indices on the Bonanza Lake and Moresby Island MUs by establishing local studies to validate the SIBEC work already completed	TFL 47	2	-
Implement	Obtain localized site productivity information	TFL 48	2	-
Implement	Monitor improved site index estimates for next analysis	TFL 49	3	-

Implement	Collect data to obtain better site productivity estimates	TFL 55	2	-
Implement	Monitor actual stand volume realized in comparison to predicted volumes in managed stands	TFL 53	3	-
Implement	Continue to collect site productivity data and compare estimates derived from the inventory data to field values	TFL 56	2	-

Issue 2: Existing unmanaged stand volumes (inventory audit; VRI phase 2)

Regional summaries (March 2001)

Type	Issue	TSA/TFL	TSR	Status
Urgent	Check volume estimates for existing stands	Kootenay Lake	1	Complete; audit 1994
Urgent	Check volume estimates for existing stands. If significant problems found, may revisit determination early.	Kispiox	1	Audit 1997
Urgent	Check volume estimates for existing stands	North Coast	1	Audit 1994
Urgent	Check volume estimates for existing stands	Bulkley	1	Audit 1994
Urgent	Check volume estimates for existing stands	Kalum	1	Audit 1996
High	Check volume estimates for existing stands	Prince George	1	Audit 1997/98
High	Check volume estimates for existing stands	Arrow	1	Complete; Audit 1995
High	Check volume estimates for existing stands	Boundary	1	Complete; Audit 1997
High	Check volume estimates for existing stands	Cranbrook	1	Complete; Audit 1996
High	Check volume estimates for existing stands	Golden	1	Complete; Audit 1994
High	Evaluate discrepancy between actual harvested and expected volumes.	Kootenay Lake	1	Complete; Audit 1994
High	Check volume estimates for existing stands	Lakes	1	Audit 1998
High	Check volume estimates for existing stands	Kingcome	1	Complete; Audit 1995
High	Check volume estimates for existing stands	Sunshine Coast	1	Complete; Audit not completed (but phase 2 VRI complete)
Info. Need	Check volume estimates for existing stands	Kamloops	1	Complete; Audit 1996
Info. Need	Check volume estimates for existing stands	Merritt	1	Complete; Audit 1996
Info. Need	Check volume estimates for existing stands	Okanagan	1	Complete; Audit 1996
Info. Need	Check volume estimates for existing stands	100 Mile House	1	Complete; Audit 1994
Info. Need	Check volume estimates for existing stands	Fort St John	1	Audit 1994
Info. Need	Check volume estimates for existing stands	Robson Valley	1	Audit 1998
Info. Need	Check volume estimates for existing stands	Mid Coast	1	Complete; audit 1994
Info. Need	Check volume estimates for existing stands	Cassiar	1	Audit 1996
Info. Need	Check volume estimates for existing stands	Nass	1	Audit 1996
Info. Need	Explore the possibilities of the addition of more sample plots within the timber harvesting land base	QCI	1	Complete; audit 1993/97
Issue	Discrepancy between actual harvested and expected volumes	Revelstoke	1	Complete; Audit 1997

Statement	(inventory overestimated).			
Issue statement	Check volume estimates for existing stands	Soo	1	Complete; audit 1997
Urgent	Check volume estimates for existing stands	TFL 18	1	Audit 1995
Urgent	Reassess the inventory for existing stand volumes	TFL 14	1	Audit 1994
High	Check volume estimates for existing stands	TFL 55	1	Audit 1996
High	Check volume estimates for existing stands	TFL 56	1	Audit 1996
High	Resolve and correct the discrepancy of actual v. expected volumes as identified in the inventory audit.	TFL 30	1	Audit 1994
High	Any further conclusions of the inventory audit will be considered in the next determination.	TFL 42	1	Audit 1996
High	Check volume estimates for existing stands	TFL 19	1	Audit 1999
High	Check volume estimates for existing stands	TFL 43	1	Unknown
Info. Need	Check volume estimates for existing stands	TFL 6	1	No audit
Info. Need	Check volume estimates for existing stands	TFL 25	1	No audit
Info. Need	Check volume estimates for existing stands	TFL 45	1	No audit completed
Info. Need	Check volume estimates for existing stands	TFL 47	1	Audit 1995/97
Urgent	Check volume estimates for existing stands.	Fraser	2	Complete; Audit 1994 and 1995; Phase 2 complete
-	Undertake further work in cooperation with Resources Inventory Branch to attempt to isolate concern regarding operational timber volumes for existing stands.	Kalum	2	Audit 1996; VRI phase 2 complete

Rationales since regional summaries (post March 2001)

Implement	Document the volume of cedar harvested relative to the volume of cedar in the inventory profile. (Note: Not really an inventory issue but more one to assess if profile assumed to be harvested in the analysis supporting the determination is in fact being harvested)	TFL 44	3	Unknown; internal audit completed ; phase 2 not done
Note	High uncertainty remains in existing stand volumes despite audit (i.e. from 0 to 16% overestimation)	Cassiar	2	Audit 1996; phase 2 unknown
Implement	Ministry staff and licensees should work to explain and reduce discrepancies between stand volumes estimated by VDYP and those measured in the field (cruises) or during scaling	Fort Nelson	2	No audit; phase 2 complete
Implement	Clarify whether the inventory data does indeed overestimate volume estimates for existing stands. Note: 1996 audit suggests this but needs to be confirmed or refined.	Kispiox	2	Audit 1997; Phase 2 unknown
Implement	If funding permits, a second phase of the audit should be carried out, with emphasis on collecting data to resolve questions about the volume estimates for existing natural stands for the operable land base in the outer and inner coast areas	Mid Coast	2	Unknown; Audit 1994; Phase 2 unknown
Implement	Fully review the concern that the forest inventory may over-estimate forest ages (as indicated by the 1999 inventory audit) and hence affect assumptions regarding the achievement of the seral stage distribution for landscape-level biodiversity	100 Mile House	2	Audit 1994; phase 2 complete
Implement	Reduce uncertainty in VRI data (i.e. address VRI phase 2	Sunshine	2	VRI phase

	volume adjustments using Fraser Protocol)	Coast		2 done
Implement	Completing Phase 2 of VRI, which is FIA funded, is very important with respect to confirming appropriate volume assignments to the inventory figures for existing mature stands. (VRI Phase 1 completed in 2001. Recompiled 1994 audit ground samples suggest 4-10% volume overestimation in new phase VRI.)	Golden	3	VRI phase 2 IP
Implement	Initiate work in the district to more accurately estimate existing stand volumes. (1999 audit suggests existing mature stands overestimated in inventory by about 12%).	Quesnel	3	No VRI work incl. phase 2
Implement	Initiate work in the TSA to more accurately estimate existing stand volumes. (Earlier audits and initial VRI phase 2 samples suggest volume overestimation)	Prince George	3	No VRI phase 2
Implement	Complete the VRI in order to provide data which will help to evaluate existing stand volumes	Mackenzie	2	15% VRI Phase 1, no phase 2
Implement	Work with MSRM to complete VRI work in the TSA to assess the reliability of existing stand volume estimates	Kamloops	2	15% VRI phase 1; no phase 2
Implement	BCFS staff and licensees collaborate to undertake VRI phase 2 prior to next determination in order to provide a better volume estimates for existing stands	Revelstoke	3	Phase 1 complete; no phase 2
Implement	Undertake work to improve the inventory in order to reduce uncertainty, in particular volume estimates for existing stands, and preferably using the standard methodology supported by MOFR FAIB, formerly with MSRM	TFL 15	3	Phase 1 complete; phase 2 sampling not completed
Implement	Complete ground sampling (Phase 2) of VRI well before the next timber supply analysis	TFL 45	2	Phase 1 complete; phase 2 IP
Implement	Complete Phase 2 of the VRI	TFL 48	2	100% VRI phase 1; phase 2 IP
Implement	Monitor VRI phase 2 estimated volume increases for mature natural stands to confirm/refine	TFL 49	3	Phase 1 and 2 complete
Implement	Complete phase 2 of VRI in order to refine estimates of existing stand volumes	TFL 52	2	VRI phase 1 and 2 IP

Issue 3: Vegetation Resource Inventory

Regional summaries (March 2001)

Type	Issue	TSA/TFL	TSR	Status
Urgent	Re-inventory required particularly in the northern portion of the TSA	Mackenzie	1	15% VRI Phase 1
Info Need	It would be very beneficial to conduct a re-inventory prior to the next determination	Fort St John	1	45% VRI phase 1
Info Need	Re-inventory for TSA recommended. Focus on Moberly PSYU first.	Dawson Creek	1	40% VRI phase 1, phase 2
Info. Need	Re-inventory information to be incorporated into TSR 2.	Kamloops	1	15% VRI phase 1
Info Need	A re-inventory of the TSA is underway	Quesnel	1	Update but no VRI
High	Licensee required to update inventory (as per Chief Forester letter of August 23, 1994) prior to next determination	TFL 41	1	No VRI

High	Re-inventory required before next determination; re-inventory plan to be approved by BCFS.	TFL 52	1	VRI phase 1 and 2 IP
High	Complete a comprehensive inventory for the TFL prior to next determination	TFL 48	1	100% VRI phase 1, phase 2 IP
Info. Need	Any required volume adjustment to be made after VRI completed, and if required a suitable revision to the AAC determined	TFL 54	1	100% VRI phase 1
High	Complete VRI before TSR 3	Fraser	2	100% VRI phase 1, phase 2
High	Strongly encourage licensee to complete the Phase 2 VRI	TFL 15	2	100% VRI phase 1, phase 2 IP
Info. Need	Undertake a new forest inventory for the TSA	Golden	2	100% VRI phase 1, phase 2 IP
Info. Need	Pursue funding for a new forest inventory	Arrow	2	100% VRI phase 1; phase 2 IP

Rationales since regional summaries (post March 2001)

Implement	Need to update VRI based on depletions and other volume-related inventory attributes in a timely manner	Fraser	3	Updated to 2001
Implement	Encourage licensee to update the TFL forest inventory (i.e. to undertake a VRI given age of the inventory (1967-70 with some updates 1976-77)	TFL 46	2	NA
Implement	Continue to update forest inventories of the TSA including VRI phase 1	Dawson Creek	2	40% VRI phase 1; phase 2
Implement	MOF staff should continue to work with Slocan to implement 5-year re-inventory plan	Fort Nelson	2	VRI phase 1 for operable land base; phase 2 incomplete
Implement	Encourage completion of the VRI project	Fort St John	2	45% VRI phase 1
Implement	Standard procedures (Fraser Protocol) for adjusting inventory attributes based on phase 2 VRI ground samples in the TSA led to problems and were therefore not used in the timber supply analysis. The problems with the use of the procedures needs to be better understood and addressed prior to the next timber supply analysis	Merritt	2	No phase 1 VRI; phase 2 done
Implement	Pursue funding for a new forest inventory for the TSA	Okanagan	2	3% VRI phase 1; phase 2 completed
Implement	The Okanagan TSA has one of the oldest forest inventories in the province; VRI phase 1 re-inventory work needs to be completed given the age of the existing inventory	Okanagan	3	3% VRI phase 1; phase 2 completed
Implement	Completed a VRI for the TSA in particular to improve the forest cover attributes	100 Mile House	2	No phase 1; phase 2 completed
Implement	Give a high priority to completing a forest cover re-inventory of the Johnstone Strait and Moresby Island MUs	TFL 47	2	NA

Issue 4: Decay, waste and breakage

Regional summaries (March 2001)

Type	Issue	TSA/TFL	TSR	Status
Urgent	Determine relationship between trees identified for high stumping as wildlife trees and assumed losses due to decay, waste and breakage	Lillooet	1	Complete; NVAF complete
High	Incorporate new provincial decay, waste and breakage factors where feasible.	Arrow	1	Complete; NVAF IP
High	Incorporate new provincial decay, waste and breakage factors where feasible.	Golden	1	Complete; NVAF IP
High	Clarify cedar and hemlock factors in Longworth PSYU	Robson Valley	1	Unknown; no NVAF
High	Investigate for red cedar in Kyuquout supply block	Strathcona	1	Yes; no NVAF
High	Incorporate new provincial decay, waste and breakage factors where feasible.	Kalum	1	Complete; NVAF complete
Info. Need	Monitor losses in balsam leading stands and refine OAF2 if required.	Morice	1	Yes; no NVAF
Info. Need	Incorporate new provincial decay, waste and breakage factors where feasible.	North Coast	1	Complete; no NVAF
Info. Need	Incorporate new provincial decay, waste and breakage factors where feasible.	Merritt	1	No; no NVAF
Info Need	Incorporate new provincial decay, waste and breakage factors where feasible.	Quesnel	1	Complete; no NVAF
Info Need	Incorporate new provincial decay, waste and breakage factors where feasible.	Williams Lake	1	Complete; NVAF complete
Info Need	Decay, waste and breakage factors require better allowances for deciduous stands within this TSA	Fort St John	1	Unknown; no NVAF
Info. Need	Inventory may be improved through collection of more localized data.	Mid Coast	1	Complete; no NVAF
Info. Need	Complete compilation and review of information for next determination	QCI	1	Complete; no NVAF
High	Quantify factors for further volume-based analysis.	TFL 43	1	Unknown
Info. Need	Review factor for next management plan	TFL 39	1	Unknown
Info. Need	Use provincial zonal factors for next determination.	TFL 19	1	Unknown; NVAF complete
Info. Need	Review and refine deduction factors based on Provincial review.	TFL 18	1	Unknown
Info Need	Incorporate new provincial decay, waste and breakage factors where feasible or further analysis by licensee may be useful.	TFL 52	1	Unknown; NVAF complete
Info. Need	Refine estimates for stands in Pemberton Supply Block with high levels of decay.	Soo	2	Unknown; no NVAF
Info. Need	Complete and determine the relevance at the stand level of ongoing studies of cedar and hemlock loss factors, in consultation with staff of Resources Inventory Branch.	Golden	2	Unknown; NVAF IP

Rationales since regional summaries (post March 2001)

Implement	Undertake studies to resolve the concern about appropriate	Arrowsmith	2	Unknown

	loss factors to account for decay, waste and breakage in existing red cedar stands			NVAF
Implement	Gather data to assess decay, waste and breakage in cedar and hemlock stands	Kamloops	2	NVAF planned for 2005
Implement	I encourage completion of NVAF sampling in the TSA as these results can be used to better account for decay and waste losses in support of future timber supply analyses	Merritt	3	No NVAF
Implement	Work with Resources Inventory Branch staff to refine decay, waste and breakage estimates for stands in the Pemberton Supply Block with high levels of decay	Soo	2	Unknown NVAF
Implement	Complete sampling necessary to develop Net Volume Adjustment Factors to replace the existing loss factors	TFL 30	2	No NVAF

Issue 5: Site productivity: alternative silviculture systems

Regional summaries (March 2001)

Type	Issue	TSA/TFL	TSR	Status
High	Timber supply implications of uneven-aged, mixed species and silviculturally treated stands.	Boundary	1	?
High	Evaluate alternative analytical approaches to assessing the timber supply implications of uneven aged silvicultural systems and mixed species management.	Cranbrook	1	Yes
High	Evaluate alternative analytical approaches for assessing the timber supply implications of uneven-aged silvicultural systems and mixed species management	Invermere	1	Yes
High	Quantify effects of intensive silvicultural activities.	Lillooet	1	-
Info. Need	Evaluate success of intensive silvicultural activities on stand volumes.	Revelstoke	1	-
Info Need	Review the partial cut regime and confirm the appropriate method of projecting stand volume estimates for regenerated stands.	Robson Valley	1	-
Info. Need	Provide improved information for the next analysis with respect to site index adjustments, alternative silvicultural systems and associated patch-distributions.	Fraser	2	-
Info. Need	Determine/quantify timber yield implications of employing alternative silviculture (including genetically improved stock) systems	TFL 47	1	-
Info. Need	Quantify growth and yield under alternative silviculture conditions.	TFL 39	1	-
Info. Need	Impact to timber supply by using alternative and intensive silvicultural systems.	Cassiar	1	Yes
Info. Need	Quantify impacts of alternative silviculture, such as wildlife trees and patch retention, on timber supply and G&Y	Bulkley	1	-
Info. Need	Modeling required for alternative harvesting systems.	Kamloops	1	Yes
Info. Need	New model(s) required for uneven aged stands.	Kamloops	1	Yes
Issue statement	Incorporation of changes to available information for dry-belt Douglas-fir stands managed on an uneven-aged basis.	Williams Lake	1	Yes
Issue statement	Prediction of long tern timber supplies for uneven aged management.	100 Mile House	1	Yes
High	Better models required to assess implications of alternative silvicultural systems. Evaluate alternative analytical approaches.	TFL 14	1	-

Info. Need	Further investigate the growth and yield and stand dynamics of residual balsam stands that are proposed to be managed as future crops.	TFL 18	2	-
Info. Need	Quantify effects of intensive and alternative silvicultural activities where possible	TFL 18	2	-

Rationales since regional summaries (post March 2001)

Implement	Monitor the impact that variable retention is having on timber availability including the productivity of regenerating stands	TFL 46	2	-
Implement	Monitor the impact that variable retention is having on timber availability including the productivity of regenerating stands	TFL 57	3	-
Implement	Licensees need to monitor their use of various silvicultural systems and the associated growth and yield implications	Cranbrook	2	-
Implement	Monitor characteristics of partly harvested forest cover polygons to improve information on species composition and assess the importance of possible volume reductions	Merritt	2	-
Implement	District staff and licensees need to work together to improve information on retention levels and growth and yield, particularly in lodgepole pine- Douglas-fir stands so that timber supply implications can be better accounted for	Merritt	3	-
Implement	The BCFS Research Branch is currently examining and reviewing expected productivity changes at varying levels of retention. It will be important to combine the emerging information with an assessment by district staff of the expected use of these systems, the extent of the areas affected, the amounts of expected retention, and the frequency of harvesting entries, for incorporation in the next timber supply analysis for the TSA	Mid Coast	2	-
Implement	Assess volume and growth losses attributable to variable retention harvesting (e.g. blow down losses)	TFL 47	2	-
Implement	Monitor the productivity of regenerating and advanced regeneration stands in areas managed under the irregular shelter wood silvicultural system	TFL 48	2	-
Implement	Continue to refine the site productivity loss estimates for areas subject to group selection	TFL 56	2	-

Issue 6: Site productivity: forest health and OAFs

Regional summaries (March 2001)

Type	Issue	TSA/TFL	TSR	Status
Urgent	Quantify impacts on volume due to pests, disease (root rot), decay, waste and breakage	Lillooet	1	Yes
High	Quantify impacts of pests, such as root rot, terminal weevil, western gall rust, spruce budworm, tussock moth, aphids and cattle grazing on stand volume.	Kamloops	1	Yes
High	Quantify impacts of root rot on stand volume and green-up.	Okanagan	1	Yes
High	Quantify impacts on volume and green-up periods due to root rot	Arrow	1	?
High	Investigate the use of additional adjustments (10-15% for stands over 200 years)	Arrow	1	Yes
High	Review and confirm or updated the estimated losses due to	Boundary	1	No

	root rot			
High	Finalize studies on the effects of stand yields and green-up of root rot.	Kootenay Lake	1	Yes
Info. Need	Initiate studies on the losses from balsam bark beetle infected stands.	Kispiox	1	Yes
Info. Need	Study more fully the impacts on volumes resulting from bark beetle infestations.	Bulkley	1	-
Info. Need	Clarify root rot losses and its relationship to OAF2 and unsalvaged losses.	Merritt	1	No
Info Need	Monitor the occurrence of root disease and stem rusts with a view to further assess the accuracy of the OAF values.	Dawson Creek	1	Yes
Issue statement	Provincial committee is examining tools for quantifying the impacts due to root rot, etc. With understanding, losses due to these agents may be mitigated.	Sunshine Coast	1	-
High	OAF1: develop a more appropriate yield estimation procedure for balsam prior to next determination	TFL 25	1	-
High	OAFs: re-examine for Douglas-fir plantations	TFL 26	1	-
High	OAFs: re-evaluate reduction factors prior to next determination.	TFL 46	1	-
Info. Need	OAFs: review procedures for defining OAFs and provide more detailed rationale for their selection	TFL 10	1	-
Info Need	Attempt to better quantify timber supply impacts as a result of armillaria infestation, as well as those expected from leader weevils.	Arrow	2	-
Info. Need	OAFs: In consultation with Research Branch staff, refined OAFs for the TSA	Cranberry	2	-
Info. Need	OAF: Determine if larger OAFs are required to account for volume losses arising from root disease.	TFL 33	2	-
Info. Need	OAFs: review and refine	TFL 18	2	-
Info. Need	OAFs: review and refine	TFL 49	2	-

Rationales since regional summaries (post March 2001)

Implement	Potential impacts of Armillaria root rot on regenerated managed stands can be significant and estimated volume losses need to be further refined	Arrow	3	-
Implement	Continue to assess and monitor losses from laminated root disease to confirm appropriate OAFs	Arrowsmith	2	-
Implement	Monitor the impact of tomentosus root disease in managed stands and the extent to which volume losses are accounted for within existing OAFs	Kispiox	2	-
Implement	Monitor impacts of Dothistroma foliar disease, balsam bark beetle and tomentosus root disease on stand volumes	Kispiox	2	-
Implement	Evaluate existing and projected impacts of various forest heath agents such as armillaria root disease	Kootenay Lake	2	-
Implement	Improve local knowledge with respect to small stocking gaps and other stand-level limits to productivity that are represented by OAF1s in managed stand yield estimation. This is a province-wide issue; however, local information is required to improve information.	Merritt	2	-
Implement	Continue to review OAF adjustments using local data	100 Mile House	2	-
Implement	OAFs: that district and licensee staff investigate if the available free growing data may be used to refine OAFs. I also request that the OAF2 values continue to be refined so that any changes in the assumptions can be incorporated into	Revelstoke	3	-

	future analyses			
Implement	Provide justification for the use of increased OAF2 values for confers other than Douglas-fir	TFL 10	2	-
Implement	Monitor OAF 1 and 2 assumptions about forest health losses and the effects of management practices (e.g. stocking survey methods) and reflect these findings in the OAF assumptions for the next TSR	TFL 15	3	-
Implement	Review the OAFs used to generate yield estimates for managed stands	TFL 35	2	-
Implement	Licensee applied non-standard OAFs yet provided not explicit documentation substantiating the lower OAF 1 reductions. Request licensee further examine and refine OAF adjustments	TFL 49	3	-
Implement	Licensee work to compile more explicit information on root rots specific to the TFL before the next analysis	TFL 49	3	-
Implement	Collect data to better estimate volume losses resulting from armillaria, and refine OAFs correspondingly	TFL 56	2	-

Issue 7: Stand dynamics outside timber harvesting land base

Regional summaries (March 2001)

Type	Issue	TSA/TFL	TSR	Status
Info. Need	Park inventories: Obtain any relevant vegetation inventories from Parks Canada so that the best available information can be used to support future timber supply reviews.	Golden	2	-
Info. Need	Aging of stands in inoperable areas: provincial issue that requires an assessment of how to best model disturbance patterns and succession in inoperable areas	Revelstoke	2	-

Rationales since regional summaries (post March 2001)

Implement	A more appropriate method needs to be developed by licensees to account for natural disturbances such as fire in stands outside the timber harvesting land based since these stands contribute to achievement of forest cover requirements for several non-timber values and thereby affecting timber supply	Arrow	3	-
Implement	A more refined method for disturbing and regenerating the non-timber harvesting land base is needed to assess if landscape-level biodiversity objectives are being met.	Cranbrook	2	-
Implement	Work with Parks Canada to obtain relevant data to assess potential contributions to landscape level biodiversity from Kootenay National Park	Invermere	2	-
Implement	A more refined method for disturbing and regenerating the non-THLB will assist in assessing if landscape-level biodiversity objectives are being met. FAIB with assistance from other Branches needs to take on this task	Invermere	3	-
Implement	Examine the contribution of forests within Wells Gray Park to landscape-level biodiversity requirements	Kamloops	2	-
Implement	A more appropriate accounting of disturbance of forests outside the land base is needed to support the next timber supply analysis given the role of these forests in achieving forest cover objectives for non-timber values and associated timber supply implications	Merritt	3	-

Implement	Aging of stands in inoperable areas: this is a provincial issue that requires assessment of how to best model disturbance patterns and succession in areas outside the THLB	Revelstoke	2	-
Implement	Collect data on the actual disturbance in the non-timber harvesting land base, and the implications of this disturbance on the contribution of the forest to old seral objectives	TFL 53	3	-

Issue 8: NSR

Rationales since regional summaries (post March 2001)

Type	Issue	TSA/TFL	TSR	Status
Implement	Assess the potential contribution of NSR stands to timber supply	Quesnel	2	-
Implement	Develop a strategy for identifying and managing backlog NSR areas and investigate FIA funding opportunities	Dawson Creek	2	-
Implement	NSR: prior to next determination, staff should reassess the areas classified as current and backlog NSR	Revelstoke	2	-
Implement	NSR: the BCFS and licensee staff review NSR records as time and resources permit, enlisting the assistance of former MSRM staff as required, so that better information is available for future determinations for the TSA	Revelstoke	3	-
Implement	NSR: I encourage BCFS staff to reconcile the area logged with regeneration delay, the area reported as NSR on the inventory file, and the NSR areas reported through ISIS	Williams Lake	2	-
Implement	NSR: provide a comprehensive accounting for all NSR areas on TFL 42 and ensure that the mgt objectives for these areas are clarified in time for the next determination	TFL 42	2	-
Implement	NSR: confirm the area of NSR land	TFL 48	2	-
Implement	Clarify expected classification of the remaining backlog NSR	TFL 55	2	-

Issue 9: Other forest inventory issues

Regional summaries (March 2001)

Type	Issue	TSA/TFL	TSR	Status
Info. Need	Low productivity sites: Undertake field assessments to determine which sites can realistically contribute to the timber harvesting land base.	Golden	2	-
High	Investigate the residual stand volumes left on site after harvesting and review the practice in respect to achieving specific objectives.	Cranbrook	1	Yes
High	Develop verification strategy to check the silvicultural labels that were assigned to the inventory	TFL 35	1	Yes
High	Determine extent to which stands are being converted to different species	Quesnel	1	Yes
High	Update timber inventory for the area previously covered by TFL 13 and for insect- and disease- attacked areas.	Cranbrook	1	Complete
Info. Need	Monitor stand impacts from bark beetle infestations and the ramifications of the associated volume losses in terms of non-recoverable losses.	Arrow	2	-
High	Models: the degree to which mature volumes may be over-	North	1	-

	estimated by the G&Y model used in the analysis	Coast		
High	Check minimum rotation lengths for high elevation stands	Golden	1	-
Info Need	Green-up: Monitor progress of young (spruce) stands and provide information to next TSR	Williams Lake	1	Yes
Info. Need	Fertilization: effects on timber supply harvest levels	Kamloops	1	No
Info. Need	Unmerchantable forest types: improve inventory for these types. A management strategy could then be developed to incorporate these stands into the timber harvesting land base.	Merritt	1	Yes
Info. Need	Species conversion: assumption of species conversion (good site fir/spruce to good site pine) at harvest needs to be verified with MOF Research Branch if to be used in the next determination.	TFL 35	1	Yes
Info. Need	Green-up: In conjunction with district, quantify green-up periods prior to next determination.	TFL 39	1	-
High	Recompile the inventory, by addition operational cruises completed since 1987, recompiling the 1970's inventory to exclude logged samples and samples in operationally cruised areas, and using the latest Kozak 4.0 taper equations.	TFL 44	2	-

Rationales since regional summaries (post March 2001)

Implement	Verify stand age/seral stage classes in landscape units/BEC areas with identified concerns	Quesnel	2	-
Implement	Timber cruise volumes from fire maintained NDT4 areas of TSA are often only about half shown in inventory; NDT4 inventory needs refinement	Cranbrook	2	-
Implement	Classify areas with the TFL that do not currently have an inventory label	TFL 48	2	-
Implement	Monitor availability of old growth forest relative to targeted objectives	TFL 53	3	-
Implement	Work with licensees to bring inventory depletions up-to-date	Morice	2	Update current to Aug. 2001
Implement	Track and quantify the area of forested land on the TFL that is denuded as a result of energy exploration and development activities	TFL 48	2	-
Implement	Monitor harvesting activities and mortality due the MPB in the problem forest types (PFTs)	Quesnel	3	-
Implement	Regeneration and stocking on unsalvaged 2003 fire areas need to be monitored to assess areas are coming back in a repressed state due to overstocking and areas that have insufficient stocking	Cranbrook	2	-
Implement	Monitor MPB infestation levels and salvaging activities	Kamloops	2	-
Implement	Assess G&Y impacts of managing stands to minimum stocking standards and not reforesting smaller openings created to salvage damaged timber	Prince George	2	-
Implement	Continue to collect data and monitor advanced balsam growth	Bulkley	2	-
Implement	Determine the extent of the area to which managed stand yield tables should be applied	TFL 26	2	

Issue 10: Traditional use studies and related issues

Regional summaries (March 2001)

Type	Issue	TSA/TFL	TSR	Status
Issue statement	Archaeological/cultural heritage: use new information when available	Soo	1	No
High	Culturally modified trees: continue efforts to map locations	QCI	1	No
Info. Need	Traditional use: incorporate information into future determination.	Kingcome	1	Yes
High	Cultural heritage resources: complete inventory and develop management prescriptions to assess impacts on the land base.	TFL 44	2	-
High	Integrated Archaeological Overview Assessment into next AAC determination	Nass	1	-
Issue Statement	A Traditional Use Survey may be conducted prior to next determination. Revisit management plan once information is collected.	TFL 41	1	-
High	Conduct impact assessment medium to high potential sites identified through AOAs.	Kamloops	1	Yes
Issue Statement	When the timber supply implications of traditional use surveys are quantified, they will be considered.	Invermere	1	Yes
Info. Need	BCFS staff to conduct an archaeological overview assessment of TFL 8.	TFL 8	2	-
Info Need	Under the TFL agreement, the licensee is required to include archaeological mapping as part of the development plan. This information will be incorporated once completed.	TFL 55	1	-
Info Need	Under the TFL agreement, the licensee is required to include archaeological mapping as part of the development plan. This information will be incorporated once completed.	TFL 56	1	-
Info Need	Cultural heritage inventory proposed or underway	Williams Lake	1	Yes
Info Need	Traditional use inventory underway in 1996; use information in future analyses.	Quesnel	1	Yes
Issue Statement	Require information on archaeological resources and traditional use	100 Mile House	1	Yes
Info Need	Incorporate AOA into future determinations	Mackenzie	1	-
Issue statement	As new traditional use information becomes available, it will be considered in future determinations	Prince George	1	-

Rationales since regional summaries (post March 2001)

Implement	Undertake the work to collect information to address data gaps around cultural heritage resources	Lillooet	2	-
Implement	Completion of TUS in the TSA is encouraged so that this information can be factored into future timber supply reviews, for example, through the identification of additional archaeological sites	Merritt	3	-
Implement	Work to improve available data on the occurrence of and mgt practices for cultural heritage resources	North Coast	2	-
Implement	Promptly report any new information with respect to First Nation's rights and titles that might affect the timber supply	Williams Lake	2	-

Issue 11: Recreation and landscape inventory

Regional summaries (March 2001)

Type by priority	Issue	TSA/TFL	TSR	Status
Info. need	Verify the recreation inventory for consistency of information between the component parts and to ensure all exclusions are valid and all overlaps accounted for. It should be ensured that the interpretation of the inventory for strategic planning purposes including timber supply reviews is consistent and logical.	Mid Coast	2	-
Info. Need	Maintain and update recreation inventories and be sensitive to public concerns in planning harvesting operations.	TFL 47	1	-
High	Complete recreation features mapping for Block 5	TFL 25	1	-
Info Need	Complete digitization so that recreation areas can be accounted for in future determinations.	Fort St. John	1	-
Info Need	Complete digitization so that recreation areas can be accounted for in future determinations.	Mackenzie	1	-
High	Review landscape inventories by mid-1977	TFL 39	1	-
High	Fulfill the commitment to review and update landscape inventories and VQO recommendations prior to next timber supply analysis	TFL 44	2	-
Info. Need	Discuss with BCFS staff the need for a more comprehensive assessment in Toba River area	TFL 10	1	-
Info. Need	Complete mapping for the Derrick and Bonus Lakes scenic areas in order to ensure these are included as visually sensitive areas in future timber supply analyses	Cranberry	2	-
High	Complete visual resource mapping for Blocks 2 and 5	TFL 25	1	-

Rationales since regional summaries (post March 2001)

Implement	The recreation inventory should be verified for consistency of information between the component parts and to ensure all exclusions are valid and all overlaps are accounted for. Errors identified in the inventory as part of this process should be corrected. It should be ensured that the interpretation of the inventory for strategic planning purposes including TSRs is consistent and logical	Mid Coast	2	-
Implement	Collect improved visual inventory information	Merritt	2	-
Implement	Include a visual landscape inventory of Tanizul and McKelvey Lakes as part of its commitment to update the visual landscape inventory	TFL 42	2	-

Appendix 2:

AAC Rationale Reports used to identify Inventory Issues

Timber Supply Area (TSA) AAC rationales:

TSA	TSR 1	TSR 2	TSR 3
Arrow	Summary	Summary	Available
Arrowsmith	Summary	Available	NA
Boundary	Summary	Available	NA
Bulkley	Summary	Available	NA
Cassiar	Summary	Available	NA
Cranberry	NA	Summary	NA
Cranbrook	Summary	Summary	Available
Dawson Creek	Summary	Available	NA
Fort Nelson	Summary	Available	NA
Fort St. John	Summary	Available	NA
Fraser	Summary	Summary	Available
Golden	Summary	Summary	Available
Invermere	Summary	Available	Available
Kalum	Summary	Summary	NA
Kamloops	Summary	Available	Available
Kingcome	Summary	Available	NA
Kispiox	Summary	Available	NA
Kootenay Lake	Summary	Available	NA
Lakes	Summary	Available	Available
Lillooet	Summary	Available	NA
Mackenzie	Summary	Available	NA
Merritt	Summary	Available	Available
Mid Coast	Summary	Available	NA
Morice	Summary	Available	NA
Nass	Summary	Available	NA
North Coast	Summary	Available	NA
Okanagan	Summary	Available	Available
100 Mile House	Summary	Available	NA
Prince George	Summary	Available	Available
Queen Charlotte	Summary	Available	NA
Quesnel	Summary	Available	Available
Revelstoke	Summary	Available	Available
Robson Valley	Summary	Available	NA
Soo	Summary	Available	NA
Strathcona	Summary	Available	Available
Sunshine Coast	Summary	Available	NA
Williams Lake	Summary	Available	NA

Summary = 2001 regional summaries
Available = rationales reviewed post-2001 regional summaries
NA = not available

Tree Farm License (TFL) AAC rationales:

TFL	TSR 1	TSR 2	TSR 3
1	NA	Summary	NA
3	NA	Summary	NA
5	NA	Summary	Available
6	Summary	Summary	NA
8	NA	Summary	Available
10	Summary	Available	NA
14	Summary	Available	NA
15	NA	Summary	Available
18	Summary	Summary	NA
19	Summary	Available	NA
23	Summary	Available	NA
24	Summary	NA	NA
25	Summary	NA	NA
26	Summary	Available	NA
30	Summary	Available	NA
33	Summary	Summary	NA
35	Summary	Available	Available
37	NA	Summary	NA
38	NA	Summary	NA
39	Summary	Available	Available
41	Summary	Summary	NA
42	Summary	Available	NA
43	Summary	Available	NA
44	Summary	Summary	Available
45	Summary	Available	NA
46	Summary	Available	NA
47	Summary	Available	NA
48	Summary	Available	NA
49	NA	Summary	Available
52	Summary	Available	NA
53	Summary	Summary	Available
54	Summary	Summary	NA
55	Summary	Available	NA
56	Summary	Available	NA
57	NA	NA	Available

Summary = 2001 regional summaries
Available = rationales reviewed post-2001 regional summaries
NA = not available

Summary of AAC rationales reviewed:

Mgt Unit	TSR 1	TSR 2	TSR 3	Total
TSAs	36	37	13	86
TFLs	26	32	9	67
Total	62	69	22	153